

DETERMINANTS OF LAND UTILIZATION PATTERN IN MADHYA PRADESH

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ABSTRACT

This paper, part of the authors' research thesis under submission examines the difference in various variables of land-use along with the trend, growth on several features of the land-utilization, and the factors accountable for the growth of gross cropped area in Madhya Pradesh, using 15-years time series data taken by several unpublished as well as published resources. The aim of this research is to classify the foremost aspects that are accountable for the progression of the "Gross Cropped Area (GCA)" in MP.

The Pearson correlation between GCA and land put to non-agricultural use, area sown and area sown more than once is 0.954, 0.904 and 0.998 respectively, which is positive, as well as greatly substantial at level of 0.01, shows the very strong and positive relationship, the other independent variables remain constant. The area under Forest also shows a positive but moderate relationship with GCA with a value of 0.553 (0.05 level of significance). The connection among GCA as well as permanent pasture & grazing lands, cultivable wasteland, and current, as well as old fallow land, is -0.759, -0.964, -0.840 and -0.821 respectively, which is negative, but highly significant at 0.01 level that shows a strong relationship between GCA and independent variables. However, the relationship between GCA and barren & uncultivable land was also found negative but not strong. The other independent variables remain constant.

The response of GCA to the factors has been revealed that the GCA is negatively influenced through Forest Area, Barren & uncultivable land, land put to non-agricultural use, Permanent pasture and other grazing land, Cultivable wasteland and Current as well as old Fallow Land which indicates that if one unit decrease in the above-mentioned factors the GCA will be increased by 1.905, 0.381, 0.444, 0.405, 1.197, 0.996 and 0.805 ha respectively (Table: 3).

The factors which positively influence the GCA are miscellaneous of tree crops & grooves, as well as Area sown. There is a change of one percent only in both the value of the factor causes a positive impact on the GCA. An increase of only 1 % in the miscellaneous tree crops & grooves area as well as area sown regularly will positively increase in GCA by 0.238 and 0.988 ha respectively.

KEYWORDS: Land Utilization Pattern, GCA, Determinants & Madhya Pradesh

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INTRODUCTION

For agriculture, land is a scarce resource. As the fundamental agricultural input, a land consumes a prominent place amongst all of the materials that are necessary for the farming sector's improvement. For land, the competition among agriculture, and the non-agriculture segment, have been increasing on account of increasing pressure on the land for the creation of food on a single hand as well as industrial expansion, development of infrastructural amenities, housing, and so on. On the other hand, though, the causal financial growth's relationships with the urbanization aren't more developed; it is the backdrop for just any of the country's financial development (Tolley 1987).

Out of the world's complete land, India with only 2.3 % aids 18% of people as well as 15 % of the livestock population in the globe. You will find 75.5 million hectares of "wasteland" in the nation of what approximately 58 million hectares are remediable as well as could be brought into the invention stage through the right procedures (report of National Remote Sensing Agency). Nevertheless, for each per capita arable land of the nation is just 0.15 ha, that is predictable to drop almost through 2025 (2007, Kanda) 0.08 ha.

It's an impossible circumstance, which on one hand much more output is needed out of the scarce dirt sources for meeting the need of the forever-growing public, though, on the further, cultivable area are now being changed to non-agricultural utilizes. India has encountered a significant shift below many land-use courses through the post-independence time.

Land utilization is greatly an active procedure. Land sources establish the base of fundamental for each human action. It's probably the most essential natural source of a nation as India where the farming sector is fairly much more visible compared to the sector of the manufacturing.

The extent and the way that the acreage is used "set the pace of a country's enhancement. The land is essential not just for produce cereals, foodstuffs, other crops and pulses for consumption but additionally for producing surpluses to meet up with increasing needs produced by rising public as well as building manufacturing sphere, for laying on the transport system, communication, building of public institution so on and dwellings.

The info on land-use pattern is necessary to improve later approaches on land utilization scheduling and land-use strategies. Land use studies are essential for the source base of the region under rational use, analysis, management" as well as conservation of the land sources. The main role of these studies is in the improvement of the agro based economy. A good analysis of existing land-use, as well as a pattern throughout the latest year, will make it possible to recommend the scope for planned shifts in the pattern. A systematic research of land utilize is vital for the origination of farming growth strategies.

Considering these challenges, a study has been done in Madhya Pradesh with an aim *i.e.* (A.) To study the change in land-use of various parameters. (B.) For estimating the trend & growth rate on different aspects of land use pattern. (C.) For identifying the factors amenable for the growth of the gross cropped area.

METHODS & MATERIALS

For interacting with the goals of previous 15 years (from 2000-2001 to 2015-16) data were taken into consideration for study, collected from published and unpublished records of GoI & GoMP and extracted from the official website *i.e.* www.landrecordcommissioner.in also "www.mpkrishi.org website on under forest, area under barren" as well as uncultivable land, land put to none agriculture utilize, permanent pasture & grazing land, area under cultivable waste, miscellaneous tree crops & Grooves, current fallow and old fellow, net area sown, area sown more than once, net irrigated, cropping intensity as well as gross cropped area for the said period. Standard deviation, coefficient of variation, absolute change, relative change, compound growth as well as simple growth rate utilized to analyze the data. The correlation coefficient was utilized to check the connections among the variables with the help of SPSS 16.0.

"Multiple regression analysis is used for evaluating factors effecting (X1 to X11) change in Gross cropped area (Y)

$$Y = a + b_1 X_1 + b_2 X_2 + b_3 X_3 + b_4 X_4 + b_5 X_5 + b_6 X_6 + b_7 X_7 + b_8 X_8 + b_9 X_9 + b_{10} X_{10} + b_{11} X_{11}"$$

Forest area, barren and uncultivable area, area under land” put to non-agriculture use, area “under permanent pastures & other grazing land, area under” cultivable wasteland, area under miscellaneous tree crops and grooves, area under current fallow, area under old fallow, net area sown, area sown more than once are measured as dependent variable.

RESULTS AND DISCUSSIONS

Land utilization underlined the dissemination of various uses under the land, and there is an effect on the ecosystem, the various parameters have been observed and presented in the following heads as given below:

“Share of Different Parameters of Land use Pattern Geographical Area”

The sharing of various parameters of land utilize pattern of (2000-01) base year and (2015-16) the current year has analyzed as well as showed in Fig 1 & 2. It has been noticed from Figure 1 that the (47.68%) of the net area sown contribute the maximum percentage in the base year of the area of geographical that followed by the forest area (28.141%), Area not available for cultivation (10.53%), Area sown more than once (10.43%), others uncultivated land Excluding fallow land (9.32%) as well as area under (4.53%) total fallow land correspondingly.

Share of various parameters of land utilize, it was noticed that, the accounted net area sown (49.26%) of maximum percentage of the total geographical area (fig: .2) followed by forest area (28.262%), Area sown more than once (27.85%), Area not present for cultivation (11.41%), others uncultivated land Excluding fallow land (7.60%) as well as area under total fallow land (3.47%) respectively.

In view of the data mentioned above, it clearly shows that net area sown in the State has increased by 1.58 percent from 47.68 to 49.26 percent in the period of the study. This represents the forest land has been likewise slightly improved from 28.141 (year of the base) to 28.262 % (year of the current). It is pertinent to mention here those areas not available for cultivation found to be raised from 10.53 to 11.41 percent. The forest area and area not available for cultivation enhanced in the study period due to afforestation programs, as well as social forestry, strict government measures against deforestation. The area under other uncultivated Land and Fallow Land are finding decreased through 1.72 and 1.06 percent respectively during the period. It has been concluded that, the area of forest, area sown as well as area under none agriculture utilize improved while, area of barren and uncultivated wasteland, permanent pasture as well as fallow area has been decrease. This is confirmed from the research that land put to none-agriculture utilizes enhanced because of diversion of common land for non-agriculture activities such as construction, industrial development, building dams as well as road network etc.

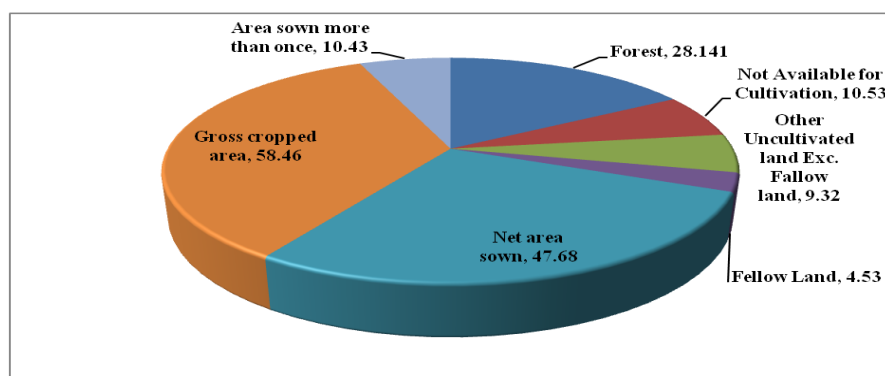


Figure 1: Share of various Parameters of Land use Pattern in Geographic Area of Madhya Pradesh in base Year.

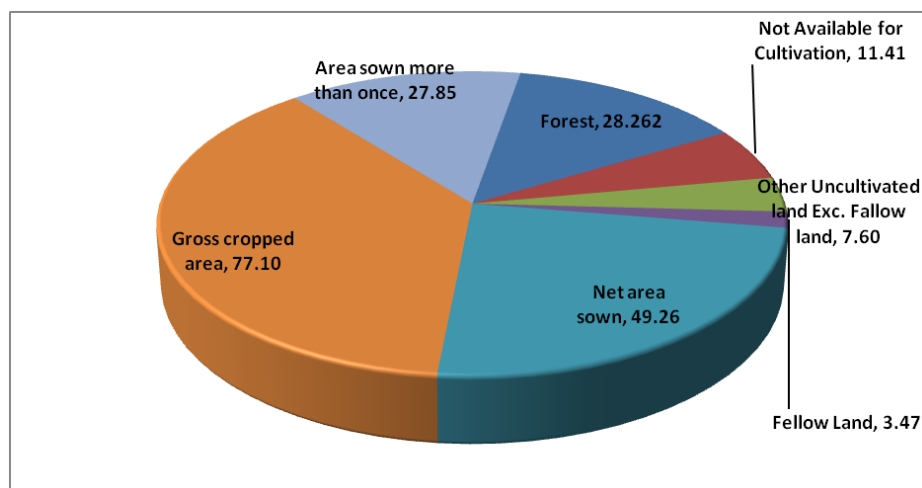


Figure 2: Share of Various Parameters of Land use Pattern in Geographic Area of Madhya Pradesh in Current Year.

Variation and Growth in Various Parameters of the Land use Pattern

In the current year, variation in various aspects of land utilization in TE 2015-16 over the year (TE 2000-2001) is shown in table 1. It is observed from the table that the parameters which had positive relative change were Forest area, Land put to non -agricultural uses, Net Area Sown, Area sown regularly, GCA and cropping intensity. Among the different parameters highest and positive relative change was observed in Net Area Sown (2380.11%), from 617213ha to 15307567ha. In case of variation, the maximum variation was found the area under current fallow land 29.86 percent.

The outcomes of CAGR for various parameters of land use to be had in table one, and the information indicated that each one classes of land use had completely positive as well as significant growth except barren & uncultivated land, permanent pasture and grazing land, cultivable wasteland and current further as old fellow land.

Table 1: "Growth and Variation in Different Parameters of Land Use Pattern"

Particulars	CY	BY	RC (%)	CV (%)	CAGR (%)
Forest Area	86.92	86.73	0.23	0.12	0.02
Barren & uncultivable land	13.54	13.87	-2.37	2.70	-0.31
Land put to non agri. Uses	21.54	18.80	14.60	5.26	1.09
Permanent pasture & other grazing lands	12.99	14.87	-12.61	5.63	-0.90
Cultivable waste land	10.12	12.11	-16.44	6.83	-1.36
Miscellaneous tree crops & grooves	0.18	0.19	-5.34	13.81	0.20
Current Fallow land	4.33	8.17	-47.02	29.86	-4.65
Old fallow lands	4.86	6.02	-19.26	9.94	-1.63
Net area sown	153.08	6.17	2380.11	1.77	0.30
Area sown more than once	85.49	36.51	134.19	29.25	6.49
Gross cropped area	238.57	183.67	29.89	9.46	1.95
Cropping intensity (%)	156	125	24.58	7.89	1.64
The current year (CY) = TE 2015-16, The base year (BY) = TE 2000-01					

Difference between land-use parameter i.e. forest area, land put to none-agriculture uses, miscellaneous tree crops & grooves, net area sown, area sown regularly, cropping intensity and Gross cropped area exhorting trend whereas, uncultivable land as well as barren, permanent pasture & another grazing land, cultivable wasteland, old fallow as well as current fallow, exhorted decreasing trend during the research.

The area sown more than once registered highest growth rate 6.488 percent per annum, followed by Gross cropped area (1.952 % per year). Increasing cropping intensity, decreasing cultivable wasteland area, old fallow & current fallow must clarify significantly the increasing trend in the GCA. The permanent pasture & other grazing land suffered from declining growth, but forest area and miscellaneous tree crops and grooves registered significant progressive growth throughout the study period, though the rate of the growth in the area under forest was not considerable (0.15 % per year). Nevertheless, the area of forest has exposed a peripheral growth; it's still much below the norms established under National Forest Policy. Non-Governmental Organizations and the government might instrument afforestation programmes to make the looked-for outcome in improving the area of forest.

The most interesting thing is that, the area under miscellaneous tree crops and grooves (0.199 % per year) showed a positive growth which is a good sign in respect of forest area. This may be because, placing the barren land in different applications such as increasing community forestry, the construction of buildings, dams, and roads may be the reason for the declining pattern of barren and Uncultivable land.

The positive and remarkable growth in Land put to non-agriculture uses 1.093 % per year is the matter of apprehension. Nevertheless, an inspiring opinion is the deteriorating trend in Cultivable wasteland; most likely due to reclaiming for agriculture use, increasing populace, as well as people search for available resource for their efficient use.

The positive and slow growth of Net area sown indicated that land utilization is shifted from Permanent pasture & grazing land, Miscellaneous tree & grooves and Barren and uncultivable land towards the area under non-agriculture uses as well as to forest in a bit.

The total cropped area, recorded a significant growth of about 2 percent per annum over a period under study. The result of growth in the total cropped area was, nevertheless, the utmost noticeable in enhancing the cropping intensity (CI) (1.644 % per year). The constant rise in cropping intensity signifies that the state is going towards the deserving path of obtaining intensive utilization of the land.

Correlation Coefficient

The Pearson correlation between GCA and "land put to non agricultural uses, net area sown and area sown more than once" is 0.954, 0.904 and 0.998 respectively, which is positive and highly significant at the 0.01 level shows very strong and positive relationship, the other independent variables remain constant. Area under Forest also shows a positive but moderate relationship with GCA with a value of 0.553 (significant at the 0.05 level).

Table 2: Pearson Correlation Coefficient (Gross Cropped Area)

Particulars	Pearson Correlation
Forest Area	.533*
"Barren & uncultivable land	-.518*
Land put to non agri. Uses	.954**
Permanent pasture & other grazing lands	-.759**
Cultivable waste land	-.964**
Miscellaneous tree crops & grooves	0.105
Current Fallow land	-.840**
Old fallow lands	-.821**
Net area sown	.904**
Area sown more than once"	.998**

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

From the above Pearson Correlation Coefficient the Following Conclusions have been Found that

The correlation between GCA and “permanent pasture & other grazing lands, cultivable waste land”, and current as well as old fallow land is -0.759, -0.964, -0.840 and -0.821 respectively, which is found negative but highly significant at 0.01 level which shows strong relationship between GCA and independent variables. However, relationship between GCA and barren & uncultivable land was also found negative but not strong. The other independent variables remain constant.

Factors Affecting Grossed Cropped Area (GCA)

The table 2&3 shows the factors responsible for changes in GCA in the State, which can be studied by using regression analysis which is performed by using SPSS16.0 where Grossed Cropped Area is regressed due to many factors i.e. forest area, barren and uncultivable, Land put to non agrilusages, cultivable wasteland, miscellaneous tree and grooves, current as well as old fallow land, net area sown and area sown more than once. The statistical model that was used in the study is multiple linear regression models.

Table: 3: Model Summary					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	1.000 ^a	1	1	13008.9	2.197

a. Predictors: (Constant), Area sown more than once, Miscellaneous tree crops & grooves, Forest Area, Barren & uncultivable land, Current Fallow land, Old fallow lands, Permanent pasture & other grazing lands, Land put to non agri. uses, Cultivable waste land

b. Dependent Variable: Gross cropped area

The general model for multiple linear regression analysis is used to check the effects of many quantitative independent variables on single response. Before the interpretation of the results, it is pertinent to check model adequacy and whether assumptions are satisfied or not.

The table 2 stated about the potency of the association between the model and the dependent variable. According to the above fitted model, the value of R and R² is 100% indicates that there is well-built relationship between variables and the variation in the GCA is explained by the above mentioned explanatory variables i.e. Gross cropped area, mixed tree crops & grooves, Forest Area, Barren & uncultivable land, Current Fallow land, Old fallow lands, Permanent pasture & other grazing lands, Land put to non agri. uses, Cultivable waste land jointly and linearly. Hence the model is adequate.

The above table shows that the value of Durbin –Watson test 2.197 is positive that means there is a positive auto-correlation. This implies that the model is well defined.

The model explicit that GCA is negatively influenced by “Forest area, Barren & uncultivable land, Land to non-agri uses, Permanent pasture & other grazing land, cultivable wasteland” and Current as well as old Fallow Land that indicates that if one unit decrease within the on top of mentioned factors the GCA are exaggerated by 1.905, 0.381, 0.444, 0.405, 1.197, 0.996 and 0.805 ha correspondingly (Table 3).

Table 4: “Factor Responsible for Change in Gross Cropped Area”

Model	Un-standardized Coefficients		Standardized Coefficients Beta	“t”	Sig.
	b	Std. Error			
(Constant)	3.60E+07	6.97E+06		5.161	0.002
Forest Area	-1.905***	0.788	-0.01	-2.418	0.052
Barren & uncultivable land	-0.381	0.408	-0.007	-0.933	0.387

Land put to non agri. uses	-.444**	0.266	-0.024	-1.674	0.145
Permanent pasture & other grazing lands	-.405**	0.234	-0.016	-1.728	0.135
Cultivable waste land	-1.197**	0.398	-0.046	-3.012	0.024
Mixed tree crops & grooves	0.238	1.87	0	0.127	0.903
Current Uncultivated land	-.996***	0.038	-0.089	-25.955	0
Old uncultivated lands	-.805***	0.321	-0.023	-2.508	0.046
Area sown more than once	.988***	0.013	0.876	73.668	0

a. Dependent Variable: Gross cropped area

b. *** "Level of Significance at 1%" probability level, ** Level of Significance 5% probability level; **"Level of Significance 10% probability level"

The factors which positively influence the GCA are miscellaneous tree crops & grooves and Area sown more than once. 1 % change in both the value of the factor causes a positive impact on the GCA. 1% rise in the miscellaneous tree crops and grooves area as well as an area sown more than once will positively increase in GCA by 0.238 and 0.988 ha, respectively.

A substantial difference has been observed in the total land use in M.P at the time of the study. The variations in the use of land clearly imitate the pressure on resources of land because of the increasing population. The upsetting features are in the arrangement of the substantial rise in the land put to non-agricultural uses, an abrupt decline in area under miscellaneous tree and groves and a rise in uncultivated land. Area that comes in the category of non-agricultural usage has grown up very fast but then not at the expense of cultivated area. With the rise in industrialization, industrial expansion, and urbanization, observing the state of ecological consideration, technology, as well as an inadequate natural resource base. It is convincing to present a long-lasting plan based on the category of land to be allocated for industrialization as well as urbanization in state.

This particular study has stated that though there is a propensity for shifting land to an agriculture purpose, and also an optimistic growth trend to enter in uncultivated lands that eventually incline to end inside the cultivable wastes. For feeding the increasing population, it is very essential to carry the arable wasteland as well as the fallow land under the cultivation for increasing the agricultural production.

The outcomes determined that the total sown area has a growing rate while barren and uncultivable land show falling trend. Therefore, this study recommends that there is a requirement for allotting uncultivable waste as well as barren land to non-agriculture usages as compared to the agricultural land. For rain fed agriculture, the government has to invest in the water harvesting as well as the advancements in the technology. Subsequently, the peasants could adapt the cash crop cultivation, wherever it seems possible. The challenges related to growth advancements could be difficult; therefore, looking for an inclusive solution has to be according to the interdisciplinary program dependant on technology as well as research advancement. As per the trend of decreasing land along with water, the land, as well as water exploitation in a maintainable way, would be the main area of the process of growing.

SUGGESTIONS AND CONCLUSIONS

The importance of the current research indicate the below mentioned for organisers, policymakers, various additional institutions, as well as agencies of the spot to convert the farming segment out of the stagnation as well as variability as well as set it on the rivulet of alternative development on one hand and also to declare the continuing inclination of the

massive commercializing scale of the farming. The implications of the research are briefly offered as following:

- About 27.92 % is the forest cover in the research that is under the necessary level of 33 percent of an overall “geographical area. Around 4.36 % of the land in the” research area comes under the uncultivated as well as barren that might be utilized for programs related to afforestation. Therefore, the forest authorities have to initiate the implementation of these programmes as well as protect the accessible forest from deforestation.
- As 6.13 % of the overall geographical area comes under fallow as well as arable wastes that can be taken under cultivation, there is a high chance of additional growth of area under cultivation. The scientist has to give importance regarding the application of cultivable as well as accessible waste along with the unfertile land for increasing the production of our state.
- Advanced researches might be carried out on shifting cultivation land to non-agriculture usages such as urbanization, dam, and road building, etc.
- There has been a substantial rise in a forest as well as agricultural land as per the previous research of past years. Therefore, it has mentioned the effect of programs associated with afforestation taken up as well as supported by the government with the alliance of the scientists.
- A researcher should stress upon the use of accessible as well as cultivable waste along with the fallow lands for increasing the yield of the particular state.

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